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A new species of *Urodacus* from Western Australia, with additional descriptive notes for *Urodacus megamastigus* (Scorpiones)

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Abstract – *Urodacus mckenziei* is described from a large collection of males and a few females from the Shark Bay region of Western Australia. It is superficially similar to *U. megamastigus* L. E. Koch. *Urodacus mckenziei* and *U. megamastigus* are critically examined and a comprehensive description of *U. megamastigus* is given to complement Koch's (1977) description.

INTRODUCTION

In a major revision of the Australian scorpion fauna, Koch (1977) published a description of an unusual species of *Urodacus*, *U. megamastigus*, which was easily distinguished from other species of the genus by the unique morphology of the male telson. The description was based upon five specimens from two separate localities in Western Australia. Since the description of the species, only six additional specimens have been uncovered.

Amongst the scorpions collected during a major biotic survey of the Carnarvon Phytogeographic District, was a large series of specimens initially attributed to *U. megamastigus*. Detailed examination of these specimens revealed that they are specifically distinct from *U. megamastigus*, and the description of this new species is presented here. Since the Carnarvon survey, two additional female specimens have been collected and these are also described here. Additional descriptive notes are made for *U. megamastigus* to complement the original description of the species (Koch, 1977).

MATERIALS AND METHODS

Specimens were collected with the aid of 20 litre pitfall traps to which a mixture of ethylene glycol and formalin was added (see Harvey *et al.*, in press). These were cleared at regular intervals over a 12 month period.

The majority of specimens are lodged in the Western Australian Museum, Perth (WAM), while individual paratypes are lodged in the Australian Museum, Sydney (AM), Australian National Insect Collection, CSIRO, Canberra (ANIC), Erich Volschenk collection (ESV), Museum of Victoria, Melbourne (NMV), Queensland Museum, Brisbane (QM), South Australian Museum, Adelaide (SAM) and Museum National d'Histoire Naturelle, Paris (MNHP).

Terminology and mensuration follows Vachon (1973), Hjelle (1990) and Sissom (1990) which differ from that used by Koch (1977) in several respects. *Urodacus* possess varying degrees of neobothriotaxic type "C" arrangements, possessing additional or fewer trichobothria than the basic "C" configuration (Vachon, 1973; Sissom, 1990) on the pedipalpal patella and chela. Both *U. mckenziei* and *U. megamastigus* possess additional accessory trichobothria, which make identification of various external groups difficult, particularly for *U. megamastigus*. In these cases, all identifiable trichobothria are named, while the remaining are collectively termed external accessory group (*ea* – patella, *Ea* – manus).

All specimens were examined using a Leica MZ6 stereo dissection microscope with a times two objective lens. Colouration is given relative to the "1994 Munsell Soil Color Chart". The authors' verbal description of the colour is followed by the colour data in square brackets ie [7.5R 4/6] represents Munsell hue code '7.5R', Value number '4' and Chroma number '6'.

SYSTEMATICS

Family Urodacidae Pocock

Genus *Urodacus* Peters

Urodacus Peters, 1861: 511.

Ioctonus Thorell, 1876: 14. Type species: *Ioctonus manicatus* Thorell, 1876, by monotypy.

† Deceased 30 June 1999

Iodacus Pocock, 1891: 245. Type species: *Iodacus darwinii* Pocock, 1891 (junior synonym of *Urodacus excellens* Pocock, 1888, by monotypy).

Hemihoplopus Birula, 1903: xxxiii. Type species: *Hemihoplopus yaschenkoi* Birula, 1903, by original designation.

Type Species

Urodacus novaehollandiae Peters, 1861, by monotypy.

Diagnosis

The genus *Urodacus* is endemic to Australia, where it is diverse in form and habitat. The genus was recently placed into its own family, Urodacidae, by Prendini (in press) following a revision of the Scorpionidae Latreille. Scorpions in the genus *Urodacus* are easily recognised by the following combination of characters: movable finger of the chelicerae with single superior subdistal tooth; pedipalp with Et_1 ventrally placed, the remaining *Et* trichobothria being external; *Dt* in the basal half on the manus; *Est* located distally; presence of only a single ventral submedian carina on metasomal segments I–IV; distal lamella of hemispermatophore without a sclerotised crest; internobasal reflection of sperm duct modified into a mating plug; ovariuterus with diverticula; sternum, longer than wide; subventral setae of tarsi spiniform; tarsi of legs I–IV with rounded, lobate laterodistal margin.

Urodacus mckenziei sp. nov.

Figures 1–16, 33–35, Tables 1–3

Material Examined

Holotype

♂, Zuytdorp, site ZU4, Western Australia, Australia, 27°15'45.1"S, 114°09'12.9"E, wet pitfall trap, 10 January–18 May 1995, M.S. Harvey *et al.*, WAM/CALM Carnarvon Survey (WAM 99/1111).

Paratypes

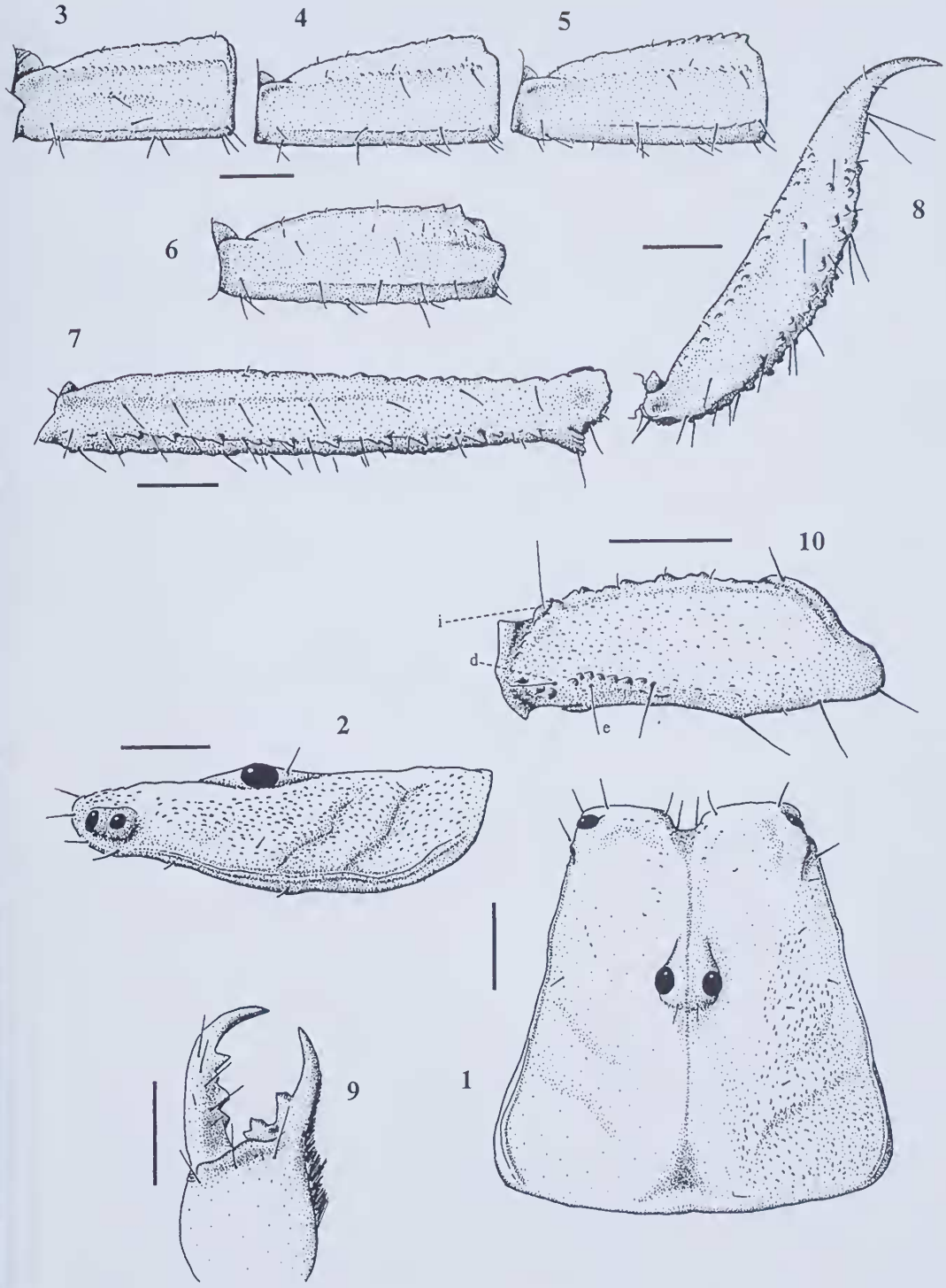
Australia: Western Australia: 16 ♂, same data as holotype (WAM 99/1112-1127); 7 ♂, same data as holotype (1 ♂ in each of AM KS62258; ANIC; ESV-4462; NMV K-7298; MHNP RS-7457; QM S51330; SAM NS1126); 1 ♀, Peron Homestead, 100 m W. of Visitors Centre, 25°50'S, 113°33'E, April 1998, T. Tischler (WAM 98/1592).

Other Material

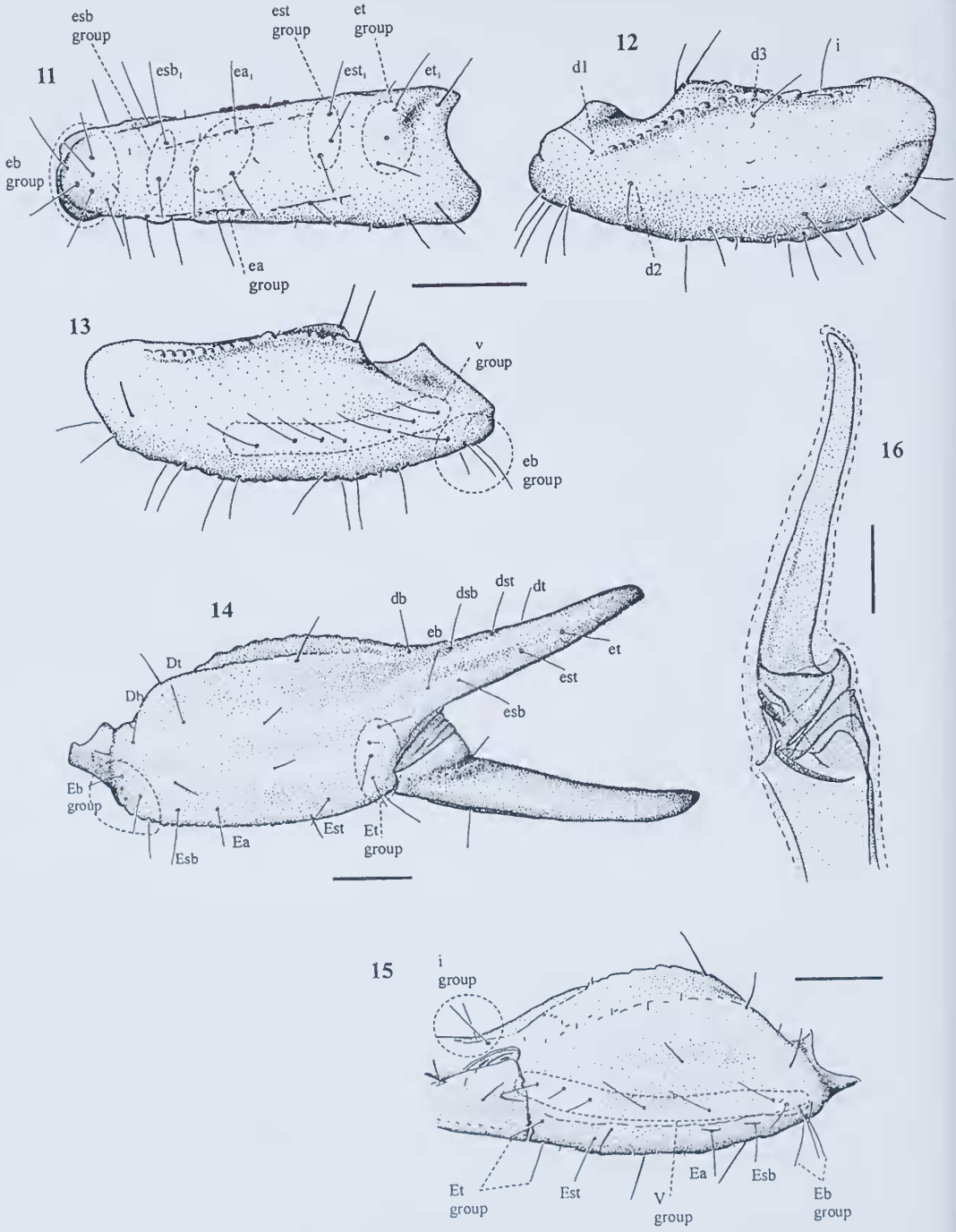
Australia: Western Australia: 23 ♂, Francois Peron National Park, site PE2, 25°52'30.9"S, 113°32'59.0"E, wet pitfall trap, 17 January–25 May 1995, M.S. Harvey *et al.*, WAM/CALM Carnarvon Survey (WAM 99/1128-1150); 10 ♂, Meedo Station, site MD1, 25°37'31.3"S, 114°42'18.8"E, wet pitfall trap, 12 January–17 May 1995, A. Sampey *et al.*, WAM/CALM Carnarvon Survey (WAM 99/1151-1160); 4 ♂, Nanga Station, site NA2, 26°29'23.0"S, 114°03'24.3"E, wet pitfall trap, 19 January–11 May 1995, A. Sampey *et al.*, WAM/CALM Carnarvon Survey (WAM 99/1161-1164); 4 ♂, Nanga Station, site NA3, 26°31'20.9"S, 114°00'08.3"E, wet pitfall trap, 19 January–12 May 1995, A. Sampey *et al.*, WAM/CALM Carnarvon Survey (WAM 99/1165-1168); 1 ♂, Nerren Nerren Station, site NE2, 27°03'24.1"S, 114°34'22.6"E, wet pitfall trap, 11 May–18 August 1995, N. Hall, WAM/CALM Carnarvon Survey (WAM 99/1169); 3 ♂, Nerren Nerren Station, site NE2, 27°03'24.1"S, 114°34'22.6"E, wet pitfall trap, 11 January–11 May 1995, P. West *et al.*, WAM/CALM Carnarvon Survey (WAM 99/1170-1172); 5 ♂, Zuytdorp, site ZU3, 27°15'49.9"S, 114°04'13.7"E, wet pitfall trap, 11 January–18 May 1995, M.S. Harvey *et al.*, WAM/CALM Carnarvon Survey (WAM 99/1173-1177); 1 ♂, Zuytdorp, site ZU4, 27°15'45.1"S, 114°09'12.9"E, wet pitfall trap, 16 October 1994–10 January 1995, N. McKenzie, J. Rolfe, WAM/CALM Carnarvon Survey (WAM 99/1178); 16 ♂, Zuytdorp, site ZU4, 27°15'45.1"S, 114°09'12.9"E, wet pitfall trap, 10 January–18 May 1995, M.S. Harvey *et al.*, WAM/CALM Carnarvon Survey (WAM 99/1179-1194); 10 ♂, Zuytdorp, site ZU5, 27°14'42.9"S, 114°11'36.1"E, wet pitfall trap, 10

Table 1 Morphometric comparisons between *Urodacus megamastigus* L. E. Koch and *U. mckenziei* sp. nov.

	U. megamastigus			*U. mckenziei*		
	Males (n=6)		Females (n=1)	Males (n=101)		Female (n=2)
	Range	Mean		Range	Mean	
Carapace length	6.5–7.5	6.60	6.50	4.0–5.3	4.72	6.08–5.29
Pedipalpal patella Length	3.8–4.4	6.20	3.40	2.5–3.3	2.89	4.93–4.26
Hand length	11.3–13.3	12.40	10.70	6.3–8.3	7.34	9.67–8.49
Hand width	3.8–4.6	4.0	3.90	2.0–2.7	2.31	2.25–2.76
Hand depth	3.1–3.5	3.20	3.00	1.3–2.1	1.81	2.37–1.99
Movable finger Length	6.0–7.5	6.80	6.20	3.5–5.0	4.20	5.68–4.66
Metasomal segment IV Length	5.2–7.1	6.20	3.10	3.5–4.7	4.16	3.51–3.71
Pectine count (left + Right)	39–47	42.30	25	34–48	39.71	28–30



Figures 1–10 *Urodacus mckenziei* sp. nov: **1**, carapace, dorsal view; **2**, carapace, lateral view; **3**, metasoma I, lateral view; **4**, metasoma II, lateral view; **5**, metasoma III, lateral view; **6**, metasoma IV, lateral view; **7**, metasoma V, lateral view; **8**, telson, lateral view; **9**, right chelicera, lateral view; **10**, pedipalp femur, dorsal view. Scale lines = 1 mm.



Figures 11–16 *Urodacus mckenziei* sp. nov.: **11**, pedipalp patella, dorsal view; **12**, pedipalp patella, external view; **13**, pedipalp patella ventral; **14**, pedipalp chela, external view; **15**, pedipalp chela (manus), ventral view; **16**, left hemispermatophore, ventral aspect. Scale lines = 1 mm.

Table 2 Comparison between counts of external trichobothrium groups of *U. mckenziei* (n=23) and *U. megamastigus* (n=8), Ranges are given where appropriate, and following a semicolon, the most common count.

Patella	*I*	*D*	*Eb*	*esb*	*ea*	*Est*	*et*	*V*	Total
U. mckenziei	1	3	5–7;6	2–4;3	2–5;4	3	3	6–8;7	28–31;29
U. megamastigus	1	3	8	1*	7–14;13	1*	1*	8–11;10	30–39;38
Manus	*I*	*D*	*Eb*	*Esb*	*Ea*	*Est*	*Et*	*V*	Total
U. mckenziei	2	2	4–7;5	1*	0–2;1	0–1;1	5	6–7;6	29–33;31
U. megamastigus	2	2	5–7;7	1*	4–6;6	1*	5	10–12;11	39–42;41
Fixed finger	*Db*	*Dsb*	*Dst*	*Dt*	*eb*	*esb*	*Est*	*Et*	
U. mckenziei	1	1	1	1	1	1	1	1	
U. megamastigus	1	1	1	1	1	1	1	1	

* – indicates groups with representatives obscured by accessory trichobothria (ea, Ea).

January–17 May 1995, M.S. Harvey, *et al.*, WAM/CALM Carnarvon Survey (WAM 99/1195-1204); 2 ♂, 1 ♀, Peron Homestead, 100 m W. of Visitors Centre, 25°50'S, 113°33'E, April 1998, T. Tischler (WAM 99/1205-1207).

Diagnosis

Urodacus mckenziei is very easily distinguishable from other known species of *Urodacus*. It differs from all except *U. megamastigus* by the very elongate and spiny telson of the male and by the elongate and spiny fifth metasomal segment possessed by both sexes. It can be separated from *U. megamastigus* by numerous features, most noticeably by the smaller size of the whole animal (figure 36); telson elongate, but not to the almost cylindrical extreme of *U. megamastigus*; aculeus possessing a pair of very long macrosetae inserting into the aculeus basally, macrosetae almost as long as the aculeus; aculeus very stout and strongly curved in *U. megamastigus*, differing from the more elongate and less curved aculeus of *U. mckenziei*. The lateral margins of the carapace are markedly convergent anteriorly, differing from the slightly convergent sides of *U. megamastigus*. External and ventral trichobothria counts of the pedipalp manus and patella are generally fewer in *U. mckenziei* than in *U. megamastigus*, particularly with respect to *eb*, *ea*, *v*, *Ea*, *V* groups (see Table 2). The enlarged peg-like macrosetae on the inner tarsal margins of legs III and IV number 6–7 and 6–8 respectively for *U. mckenziei* and 9–10 and 9–11 respectively for *U. megamastigus* (see Table 3).

Description

Colouration: mostly uniform reddish yellow [10YR 7/8]; carapace with darker blackish [10YR 3/1] areas surrounding lateral and median ocular tubercles; femora, patellae and metatarsi of the legs yellowish [10YR 8/6] with distinct reddish brown [2.5YR 4/8] articulating points.

Carapace (Figures 1 and 2): generally covered with numerous fine and rounded granules, median ocular area very finely shagreened; frontal notch shallow, with frontal lobes conspicuously truncate, their anterior margins almost straight; median furrow present. Two corneae in each lateral ocular tubercle, anterior of which being much larger than posterior (Figure 2).

Mesosoma: yellowish [10YR 7/6] with a darker [10YR 5/3] medial band, the heart discernable through the cuticle; tergites with many fine granules, otherwise shagreened; no median or lateral carina present. Sternites: surface smooth, except for extreme lateral regions which contain few (posteriorly) to numerous (anteriorly) small rounded granules; posterior margins smooth and slightly concave. Spiracles are small, diagonal and moderately elongate.

Sternum: sub-pentagonal, wider than long with a furrow running medially through the posterior half. Genital operculum wider than long, divided in males and fused in females. Male genital papillae protrude from beneath the operculum.

Metasoma (Figures 3–8): colouration darker yellowish brown [7.5YR 5/6]. Male metasomal segments I–IV with dorsal, dorsolateral, ventral and

Table 3 Comparison of male peg-like tarsal seta counts for right legs of *U. mckenziei* males (n=23) and *U. megamastigus* (n=5).

	Tarsus I		Tarsus II	
	U. mckenziei	*U. megamastigus*	*U. mckenziei*	*U. megamastigus*
External	6–8	6–8	6–8	6–8
Internal	5–7	9–10	6–7	9–11
	Tarsus III		Tarsus IV	
External	7–9	6–8	7–9	6–8
Internal	6–7	9–11	6–8	10–12

ventromedian carina, dorsal carina not terminating in large spines. Dorsal and dorsolateral carina of metasomal segments I–III with irregularly spaced large, sharp granules, metasoma IV with numerous large sharp granules and with weekly developed dorsolateral carina; remaining carina non-granular and defined by conspicuous edge uniting flat surfaces. Metasomal segment V very elongate, more than 6 times longer than deep in males, shorter in females. Ventrolateral and posterior transverse carina with numerous large to small posteriorly directed spine-like granules; numerous macrosetae along lateral and ventral margins of segment V, posterior dorsal margin produced into a lobe. Telson (Figure 8): very elongate, longer than metasomal segments I–IV; vesicle moderately expanded but not bulbous, possessing numerous spine-like granulations (varying in size from large to small) and macrosetae on the ventral surface, only three to five macrosetae and few granulations on the lateral surfaces with the exception of a longitudinal dorsal row of large-small granules; aculeus elongate, moderately curved, with two very long macrosetae ventrally placed on its base. Females similar to male description except that metasomal segment V and the telson are only moderately elongate (Figure 34).

Chelicerae (Figure 9): teeth without secondary serrations; fixed finger with d moderately elongate and moderately curved towards movable finger; sb with the proximal tooth edge slightly incurved and distal edge slightly outcurved; sd and m teeth widely spaced; basal tooth normal. Base of fixed finger with a small pit between sd and m into which b of the movable finger slots when the fingers are closed. Movable finger with id long and elongate and moderately curved towards the movable finger; ed with margins not curved; sd, m, and b well defined and triangular.

Pedipalps: reddish yellow [10YR 6/7] with darker sclerotised carinal granules and chelal fingers. Femur (Figure 10): with irregularly scattered granules on anterior and posterior margins; trichobothria, *i*, *d* and *e*, present. Patella (Figures 11–13) with few scattered granules on anterior and posterior margins. Trichobothria; total of 28–31, usually 29 present; Internal trichobothrium (i) in the distal third of the patella. The external trichobothria et_1, est_1, ea_1 and esb_1 form a longitudinal row in the dorsal half of the external surface. The external median group (*em*) difficult to distinguish because of accessory trichobothria in the region, external sub-terminal group (*est*) with three trichobothria, of which est_1 is in the dorsal half while est_2 and est_3 are in the ventral half of the patella. Trichobothria counts are summarised in table 2. Chela (Figures 14–15): hand narrow and moderately flat; external surface with moderately granulated keel; dorsal surface with faint, smooth keel. Trichobothria: total of 29–33, usually 31 trichobothria present and summarised in table 2; Et_1 placed ventrally and external to the ventral carina. Dorsal trichobothria of the manus as follows, *Db* in the proximal quarter of the hand, slightly anterior to *Eb* group; *Dt* also in the basal half of the manus, anterior and more internally placed relative to *Db*. All trichobothria of fixed finger present: *eb* very basal on finger, sometimes on the distal portion of the hand, rather than the fixed finger, *esb* usually closer to *eb* than to *est*; *est* closer to *et* than to *esb*; *db*, *dsb*, *dst* and *db* spaced equidistantly in the basal half of the fixed finger *dt* placed medially on the internal face of the finger, between and opposite *esb* and *est*. Internal terminal (*it*) and *ib* present in the basal portion of the fixed finger. Fingers moderately long; both fingers with numerous small teeth in several rows.

Legs: pale yellow brown [YR10 8/6] with reddish brown [10R 5/8] articulating points; tarsomere of legs I and II with four large and one small dorsal spines; claws of unequal length with anterior claw noticeably longer than posterior claw especially on legs III and IV. Two rows of stout spiniform setae present on the ventrolateral margins of tarsi, the counts of which are summarised in Table 1.

Hemispermatophore as shown in Figure 16.

Pectines: ♂, 16–25; ♀, 14; with the exception of tooth counts, the pectines are typical for the genus and not sexually dimorphic.

Remarks

Urodacus mckenziei has only been collected from the Carnarvon region of Western Australia.

Etymology

The species is named for Norman I. McKenzie in appreciation of his contributions to biogeography in Australia.

Urodacus megamastigus L.E. Koch

Figures 17–35, Tables 1–3

Urodacus megamastigus L.E. Koch, 1977: 229–231, figs 12, 27, 56, 100, 101, 123, map 18.

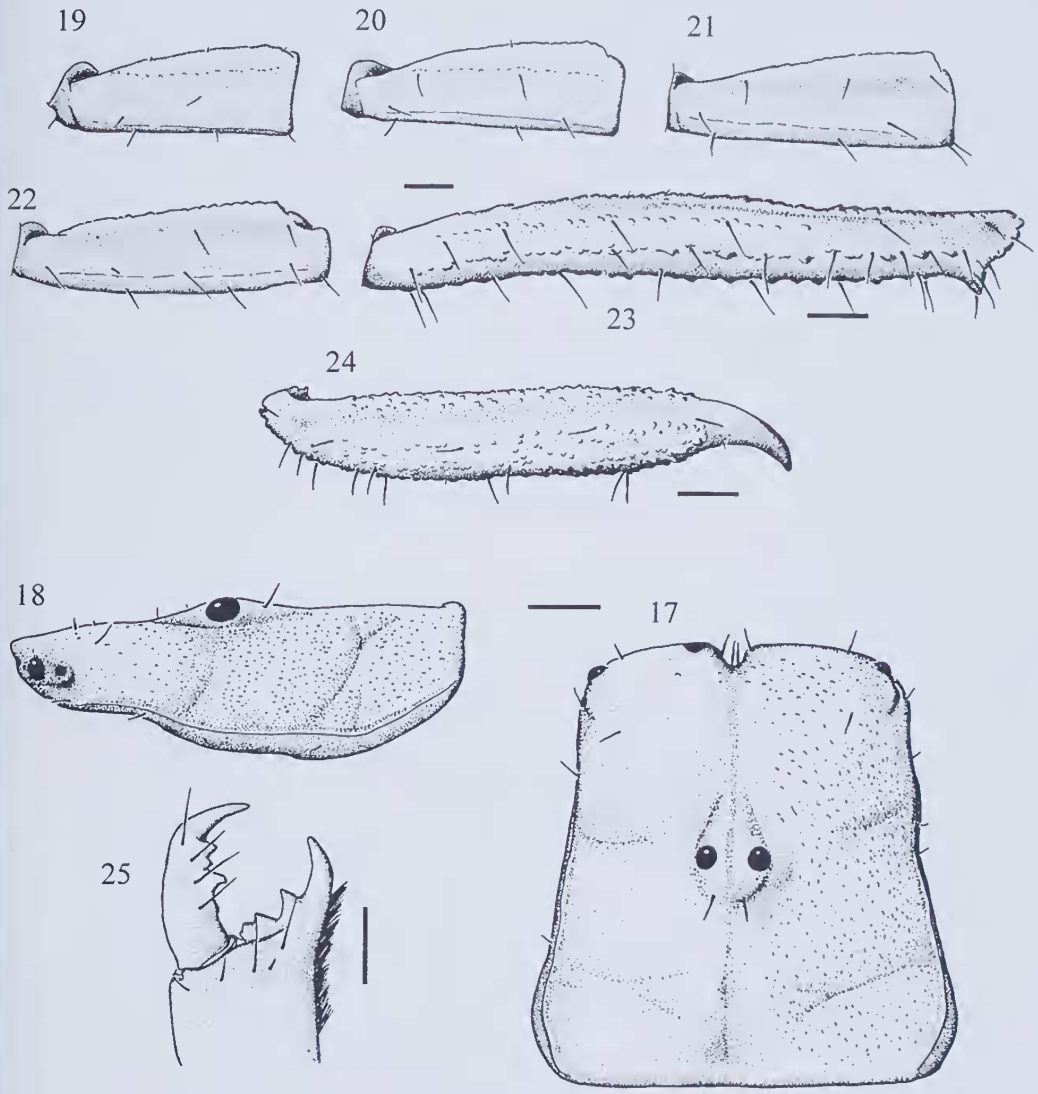
Material Examined

Holotype

♂, Mundiwindi, Western Australia, Australia [23°50'S, 120°10'E], 8 April 1963, A. Snell (WAM 66/368).

Paratypes

Australia: Western Australia: 2 ♂, same data as holotype except 1963 (WAM 68/366-367); 1 ♂, 1 ♀, Walgun Station [23°12'S, 120°43'E], 21 May 1971, A.M. Douglas (WAM 71/1784-1785).



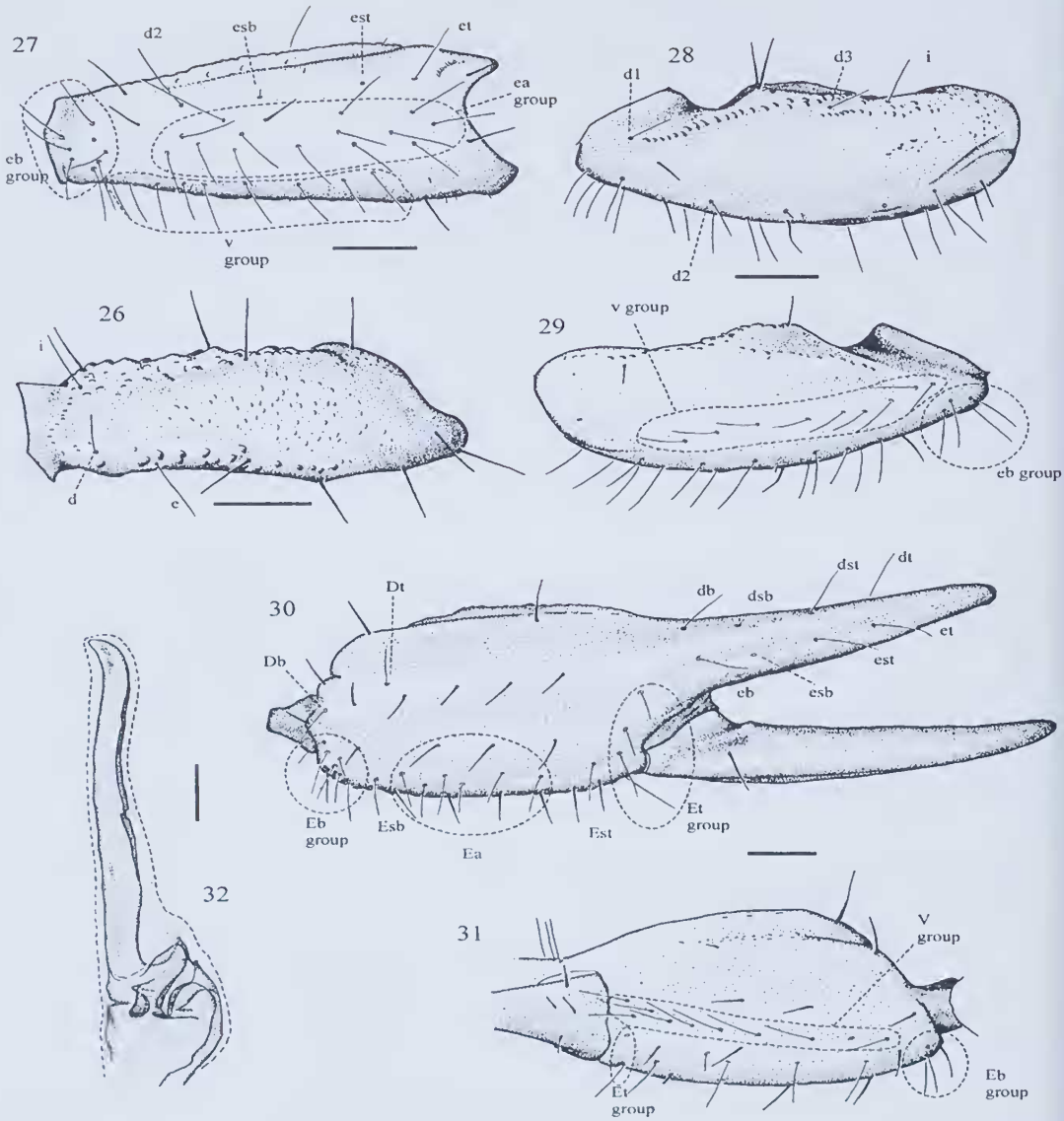
Figures 17–25 *Urodacus megamastigus* L.E. Koch: **17**, carapace, dorsal view; **18**, carapace, lateral view; **19**, metasoma I, lateral view; **20**, metasoma II, lateral view; **21**, metasoma III, lateral view; **22**, metasoma IV, lateral view; **23**, metasoma V, lateral view; **24**, telson, lateral view; **25**, right chelicera, lateral view. Scale lines = 1 mm

Other Material

Australia: Western Australia: 1 ♂, Millstream [21°35'S, 117°04'E], low spinifex over gravel, 8 May 1986, D. King, J. Gardner, M. Calver (WAM 99/1208); 1 ♂, Meridian (wildcat oilwell), 30 miles E. of Willara Hill, Great Sandy Desert, ca. 19°03'S, 122°22'E, 25 May 1982, A.M. Douglas (WAM 99/1209); 1 ♂, Newman area, ca. 23°21'S, 119°44'E, April 1984, D. Kaljuste (WAM 97/3148); 3 ♂, Mt Brockman Station, site 30, 22°18'27"S, 117°15'27'E, 11 May 1999, pitfall traps, P.J. West (WAM 99/1211-1213).

Diagnosis

Urodacus megamastigus is one of the most striking representatives of the genus. It is most similar to *U. mckenziei* but can be separated using several features including: the much larger adult size of *U. megamastigus*; extremely elongate metasomal segment V, more than seven times longer than deep in males; the telson is also more elongate, to the extent of being almost cylindrical in males, females with telson more typical for the genus; aculeus stout and sharply curved in the distal half. *Urodacus megamastigus* (Figure 36) possesses more numerous



Figures 25–32 *Urodacus megamastigus* L.E. Koch: **26**, pedipalp femur, dorsal view; **27**, pedipalp patella, dorsal view; **28**, pedipalp patella, external view; **29**, pedipalp patella ventral; **30**, pedipalp chela, external view; **31**, pedipalp chela (manus), ventral view; **32**, left hemispermatophore, ventral aspect. Scale lines = 1 mm.

trichobothria on the pedipalps patella and manus (Table 2); tarsi of legs III and IV also with more numerous spiniform setae on the ventrolateral margins (Table 3).

Description

Colouration: mostly uniform yellow brown [10YR 4/4]; carapace with slightly darker areas only in the immediate vicinity of the lateral and median eyes. Legs and metasomal segments paler yellowish brown [10YR 5/6] external margin of femora, patellae and metatarsi with distinct red [2.5YR 3/6] articulating point.

Carapace (Figures 17, 18): almost entirely covered with numerous fine granules; frontal notch shallow; frontal lobes truncate, with anterior margins slightly convex. Median furrow moderately deep; lateral eyes, in low tubercles, each with two corneae, the anterior being considerably larger than the posterior. Median ocular tubercle well

developed, and finely shagreened.

Mesosoma: Yellowish brown [YR10 4/4] with no indication of a medial band. Tergites finely shagreened with few very small granules, posterior margins almost straight. Sternites smooth and without granules, lateral margins smooth, posterior margins concave to slightly concave, and smooth. Spiracles large, slit-like and diagonal.

Sternum: sub-pentagonal, wider than long; possessing a moderate furrow placed in the median posterior half. Genital operculum; divided in mature males, with genital papillae protruding from beneath; fused in females.

Metasoma (Figures 19–24): dorsal, dorsolateral, ventral and ventromedian carina present on segments I–V although incomplete on segment V, losing integrity in the distal quarter. Segments I–IV mostly smooth with few moderate rounded granules confined to carina. Male; metasoma V very elongate and possessing numerous setae laterally and ventrally; telson (Figure 5) very elongate, longer than each of metasomal segments I–IV; covered ventrally and ventrolaterally with elongate, spine-like granulations; aculeus short and thick, distally hooked. Female metasoma much shorter than that of male, telson and metasoma V moderately elongate but not to the extent of the male, granulation and setation of metasoma V similar to that of the male, but telson without large granules.

Chelicerae (Figure 25): teeth without secondary serrations. Fixed finger with proximal edge of sub-basal tooth slightly incurved; basal tooth often slightly bilobed and fused with median tooth to form a tri-cusp.

Pedipalp reddish yellow [7.5YR 6/8] with darker sclerotised carinal granules and chelal fingers. Femur (Figure 26): with irregularly scattered granules on anterior and posterior margins; with 3 trichobothria, *i*, *d* and *e*. Trichobothrium *d* positioned slightly more proximal (almost medially) to femur anterior margin than *e*. Flat surfaces with evenly scattered, fine round granulations.

Patella (Figures 27–29, Table 2): with scattered granules on anterior and posterior margins; total of 30–39 trichobothria present, usually 38; d_1 displaced externally and along with eb_1, esb_1, *est* and et_1 form a distinct line in the dorsal half; the presence of numerous accessory trichobothria make defining all but the external basal group (*eb*) et_1, *est* and esb_1 impossible on the external surface. Trichobothria counts are summarised in table 2. Chela (Figures 30–31, Table 2): hand narrow and moderately flat; internal surfaces with moderately granulated keel; dorsal surface with faint, smooth keel. Fingers moderately long; both fingers with numerous small teeth in several rows; trichobothria total of 39–42, usually 41 *Db* very basal on the hand and below the intermediary carina, *Dt* anterior to *Db*, but still in the basal half of the hand and placed on the dorsal side of the intermediary carina. Fixed finger with: *dt* placed in the base of the distal quarter of the

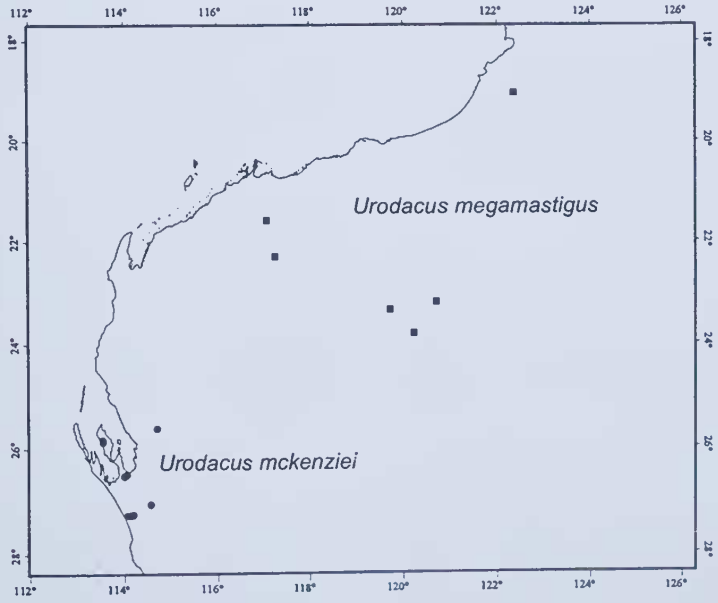


Figure 33 Map showing known distributions of *Urodacus megamastigus* L.E. Koch and *Urodacus mckenziei* sp. nov.

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Figures 34–35 *Urodacus mckenziei* sp. nov. telson: **34**, female; **35**, male. Scale lines = 2 mm.

finger, *db*, *dsb* and *dst* sub-equally spaced, *dst* closer to *dt* than to *dsb*, *db* very basal on the finger; *est* placed medially on the finger with *et* more proximal to *esb* than the distal end of the finger, *eb* and *esb* in the basal quarter of the finger, *esb* closer to *eb* than to *est*.

Legs: metatarsus I with four large and one small dorsal spines; lateroapical margin of pedal tarsi produced into rounded lobes; claws sub-equal in length.

Hemispermatophore as shown in Figure 32.

Pectines: ♂, 19–25; ♀, 12–13; usual for genus and with exception of tooth counts, are not sexually dimorphic.

Remarks

Urodacus megamastigus is only known from five localities (Figure 33), and the six new specimens listed above extend its known range further to the north. Its distribution is more northern and eastern than that of *U. mckenziei*. This species is unusual amongst species of *Urodacus* in the extreme level of sexual dimorphism exhibited on the metasoma. *Urodacus* frequently demonstrate sexual dimorphism involving metasomal segments, usually expressed with larger terminal spines on the dorsal keel of the males (Koch, 1977). Only *U. megamastigus*, *U. mckenziei*, *U. varians* and *U. elongatus* have developed the extreme elongation of metasomal segment V (Koch, 1977); however in *U. elongatus* all of the metasomal segments are elongate.

DISCUSSION

Koch (1977) divided *Urodacus* into five species-groups, largely based on the morphology of chelicerae, number of denticle rows in the basal and distal halves of the pedipalp chela movable finger, relative lengths of the tarsal claws and morphology of the hemispermatophore. Because of the striking morphology of *U. megamastigus*, it was placed in its own group, based mostly upon its extremely elongate telson. Koch (1977) noted the resemblance between *U. megamastigus* and members of the *U. armatus* species-group. *Urodacus mckenziei* possesses characteristics of the *megamastigus* group – elongate telson, *armatus* group – chelicerae without secondary serrations, as well as *hartmeyeri* group – moderately unequal tarsal claws. We ignore the species groups erected by Koch (1977) and leave *U. mckenziei* and *U. megamastigus* ungrouped. *Urodacus* represents one of Australia's most problematic scorpion genera, second only to *Lychas* C.L. Koch (Buthidae). A brief examination of the numerous specimens lodged in the Western Australian Museum revealed problems in the key presented by Koch (1977) with quite different animals frequently keying out to the same species. It is likely that *Urodacus* is much more diverse than is currently recognised, and is in need of a thorough revision.

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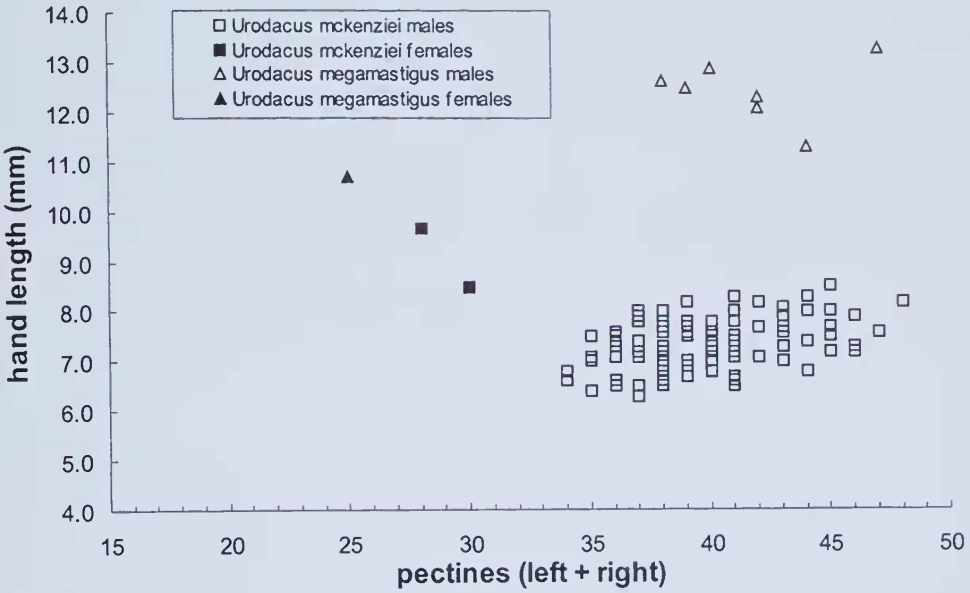

Figure 36 Graph depicting size differences between *Urodacus megamastigus* and *U. mckenziei*.

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